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February 23, 1996

To: Delta Protection Commission

From: Margit Aramburu, Executive Director

Subject: Staff Report and Environmental Analysis for Proposed Amendment to the Land Use and Resource Management Plan for the Primary Zone of the Delta and Adoption of Regulation Governing Siting of New Sewage Treatment Facilities and Areas for Disposal of Sewage Effluent and Sewage Sludge in the Primary Zone of the Delta

BACKGROUND

In February, 1995, the Delta Protection Commission (Commission) adopted the Land Use and Resource Management Plan for the Primary Zone of the Delta (Plan) which included Utilities and Infrastructure Policy P-3 (P-3). That policy stated:

> New sewage treatment facilities (including storage ponds) and areas for disposal of sewage effluent and sewage sludge shall not be located within the Delta Primary Zone.
>
> [Note: The Rio Vista project, as described in the adopted Final Environmental Impact Report for such project, and the Ironhouse Sanitary District use of Jersey Island for disposal of treated wastewater and biosolids are exempt from this policy.]

The Commission was sued by Wheelabrator Clean Water Systems, Inc., Bio Gro Systems Division in Sacramento County Superior Court. The issue in the case was whether P-3 was a "regulation" subject to the provisions of the Administrative Procedure Act

(APA). The APA requires that regulations adopted by State agencies be reviewed and approved by the Office of Administrative Law before they may take effect.

Superior Court Judge Thomas Cecil ruled that P-3 constitutes a "regulation" under the APA. The Judge's decision applied to P-3 only. The Judge declared P-3 to be invalid "for a substantial failure to comply with the APA". The Commission has agreed to abide by the Judge's ruling (rather than file an appeal), and to "set aside" P-3.

PROPOSED ACTION BY THE COMMISSION

In compliance with the APA, the Commission proposes to adopt P-3 as a regulation and to amend the Plan to include P-3. Thus the Commission proposes three related actions: adopting a regulation, amending the Plan, and complying with the California Environmental Quality Act (CEQA) before it acts on the regulation.

1. Regulation

Notice of the proposed adoption of the regulation was published on Friday, February 23, 1996. The notice provides a public comment period from February 23, 1996 and ending April 8, 1996. The notice also provides for three public hearings on the proposed action:

Thursday, March 28, 1996 at 6:30 p.m. at Jean Harvie Community Center, 14273 River Road, Walnut Grove.

Thursday April 4, 1996 at 10:00 a.m. at the Roberts Island Union Farm Center, 4925 W. Howard Road, Roberts Island.

Monday, April 8, 1996 at 10:00 a.m. in the Theater at the Antioch Community Center 213 F Street, Antioch.

If adopted, the regulation will be submitted to OAL for its review and approval. The regulation would take effect 30 days after the OAL approves it, unless an earlier effective date is approved.

2. Plan Amendment

To amend the Plan, the Commission must prepare and circulate a notice for distribution as required in the Commission's regulations to the Commission, to agencies with authority over the Delta, and to interested parties. The staff must prepare and distribute a staff report and hold at least three public hearings--one in the North Delta, one in the South Delta and one in the West Delta. The Commission must adopt the proposed amendment by a majority of the membership of the Commission (ten votes).

3. CEQA Compliance

To comply with CEQA, the Commission has adopted regulations which allow the Commission to use its environmental documents in lieu of preparing negative declarations or environmental impact reports. To meet CEQA's requirements, the report must analyze potentially significant adverse environmental impacts which may result from the proposal, analyze feasible alternatives and mitigation measures to minimize any significant adverse environmental impacts, address short-term and long-term effects on the environment, and address growth-inducing effects and potential cumulative impacts. All comments raising environmental points must be summarized and responded to in a report to the Commission. Prior to adoption of the proposed amendment, the Commission must determine if the proposed amendment will result in significant adverse environmental impacts.

ANALYSIS

1. Text of the Proposed Regulation

The language of the proposed regulation (the same as the language previously adopted as P-3) states:

> New sewage treatment facilities (including storage ponds) and areas for disposal of sewage effluent and sewage sludge shall not be located within the Delta Primary Zone.
>
> [Note: The Rio Vista project, as described in the adopted Final Environmental Impact Report for such project, and the

Ironhouse Sanitary District use of Jersey Island for disposal of treated wastewater and biosolids are exempt from this policy.]

2. Plan Amendment

The Commission proposes to incorporate the adopted regulation (the same language as P-3) into the Plan as an amendment. The language (see above paragraph) would apply throughout the Primary Zone (see attached map), and affect all local governments with lands in the Primary Zone. Local governments would need to ensure that their general plans are in compliance, and would need to ensure that new projects conform to the amended language.

Other local governments including Merced County and Stanislaus County have developed similar ordinances, urged largely by the agricultural community, seeking long-term protection of agricultural land resources (see "No Sludge, Farmers Tell Supervisors", Modesto Bee, 2/2/95)

It should be noted that San Joaquin County, which includes about 38% of the Primary Zone, has adopted a General Plan policy which precludes placement of sewage effluent and sewage sludge in the Delta Primary Zone within San Joaquin County. Solano, Contra Costa, and Yolo County have proposed adoption of language that would ensure all new projects to be in conformance with the Plan.

The proposed amendment would be included in the Utilities and Infrastructure section of the Plan, and would be located in the policies section, following P-2.

The language in P-3 had been included in the Plan when it was adopted in early 1995, after several public hearings were held before the Commission. At the hearings public testimony was submitted to the Commission about possible adverse effects from sewage sludge and effluent disposal or land application and potential cumulative impacts to the Delta agricultural lands and wildlife habitat which could be associated with use of these lands for disposal of sewage effluent and/or sewage sludge.

PURPOSE AND EFFECT OF PROPOSED REGULATION

The purpose of the regulation is to protect Delta Primary Zone natural resources, including soil, surface water, groundwater, wildlife and riparian habitats, from possible contamination by materials associated with sewage treatment facilities and with placement of sewage effluent and sludge including viruses, bacteria, metals, and salts. The regulation will also protect existing land uses in the Primary Zone, including agriculture, wildlife habitat and recreation, from displacement or impairment due to construction of new large sewage treatment facilities.

The Commission's authority for adoption of the proposed regulation is found in the Delta Protection Act, which states "the commission shall prepare and adopt...and thereafter review and maintain a comprehensive long-term resource management plan for lands uses within the primary zone of the delta...the regional plan shall meet the following requirements: (2) conserve and protect the quality of renewable resources, (3) preserve and protect agricultural viability, (5) preserve and protect delta dependent fisheries and their habitat...(7) preserve and protect the water quality of the delta, both for in stream purposes and for human use and consumption...(12) protection the delta from any development that results in any significant loss of habitat or agricultural land" (PRC, Section 29760). The Act also states "the commission shall adopt its own rules, regulations, and procedures necessary for its organization and operation" (PRC, Section 29752). The Act also recognizes the threat of continuing degeneration of natural resources in the Delta (PRC Section 29706) and charges the Commission to protect these resources.

The effect of the regulation will be continued use of Delta Primary Zone lands for agriculture, wildlife habitat and recreation under management practices which will help to protect the renewable resources of the Delta from possible contamination or degradation.

The U.S. Environmental Protection Agency (EPA) has adopted regulations on the content and handling of sewage sludge, but they are not comparable to this regulation. The EPA regulations include only minimal criteria regarding site suitability, for example, application cannot adversely affect a threatened or

endangered species, cannot be applied to lands which are flooded so the sewage enters a wetland or waters of the United States, and cannot be applied 10 meters or less from waters of the United States. The EPA regulations do not address characteristics of the soil, the surface elevation of the site, location in a flood plain, depth to groundwater, and many other factors.

The EPA regulations recognize State and local authority exists for the adoption of more stringent regulations by local governments. The federal regulations recognize that State and local governments may impose requirements for the use or disposal of sewage sludge in addition to or more stringent than the requirements in this part when necessary to protect public health and the environment from any adverse effect of a pollutant in the sewage sludge, and state: "...nothing in this part precludes a State or political subdivision thereof or interstate agency from imposing requirements for the use or disposal of sewage sludge more stringent than the requirements in this part or from imposing additional requirements for the use of disposal of sewage sludge."(40 CFR Section 503.5)

The proposed regulation is needed to protect Delta resources and to address the following conditions and concerns:

1. Soils and Hydrology

Due to unique soil conditions and hydrology, much of the Primary zone is at constant risk of flooding and/or inundation. The Delta has been described as a mat of peat soil floating atop a large pool of water. Much of the Delta is actually below sea level and is protected by levees from daily inundation. Many areas of the Delta must be vigorously drained and pumped to keep the groundwater table below the surface of the land and to avoid flooding. This means most of the Primary Zone is continuously subject to potential flooding if pumping were to cease or a levee break were to occur. There have been repeated levee breaks in the Delta. Two small islands flooded as recently as 1995. Levee breaks can result from various causes including overtopping, erosion by floodwater, weak spots (beaver burrows, fallen root tree balls) and others. The Delta levees are also susceptible to failure due to seismic activity. In the case of a levee break or rising groundwater soon after placement of sewage effluent and/or sewage sludge, flood waters would carry off materials placed on

the islands's surface and contaminate significant other land and water areas. The low surface elevation, location in the flood plain, and soils subject to subsidence make lands in the Primary Zone inappropriate as location for a new sewage treatment plant, as well as inappropriate for sewage sludge and effluent application or disposal.

The Delta also represents a unique hydrologic regime due to the below sea level land surface elevation and the dynamic inter-relationship of surface water and groundwater. Due to historic subsidence, areas of high percentage peat soil have subsided below sea level, with many areas more than 15 feet below sea level. In these areas the groundwater would naturally be located at approximately sea level. Depending on the human controlled pumping regime for a below sea level island, the surface water can easily commingle with groundwater. For example, in the late fall and winter, land managers often stop pumping and allow the fields to flood to control subsidence, to control weeds, and to provide seasonal wildlife habitat. This is an historic practice. In these periods, surface water commingles with groundwater. If one island is under several different property managers, the practices of one manager will affect the nearby lands. If one manager seeks to keep his lands "dry" by pumping through the winter months and a nearby manager floods his lands, the affects on the "dry" lands are unpredictable, burdensome, and expensive. In addition, on some islands crops are "subirrigated". This means the groundwater is allowed to rise to an elevation which provides moisture to the crop. Any excess waters are drained into the numerous ditches which criss-cross the islands and which allow excess water to flow toward a discharge pipe at the lower elevation portion of an island. The exchange between surface water and groundwater is common and runoff from or releases associated with application of sewage effluent and sewage sludge could have an adverse effect on aquatic values in the Delta Primary Zone.

Numerous studies and reports have indicated that pathogens, such as bacteria, virus, and parasites, remain in sludge and can affect human health, and that these materials can migrate up to 60 feet through soil when sewage effluent has been applied to land for groundwater recharge. Nitrates have been identified as a key potential problem, especially to groundwater drinking water supplies (groundwater is the primary drinking water supply for residents of the Delta Primary Zone).

The EPA regulations (40 CFR Part 503) address the general suitability of potential sites for disposal of effluent and/or sludge, but the restrictions are minimal and do not address the unique geographic and topographic situations found in the Delta Primary Zone. For example, the EPA regulations prohibit application of bulk sewage sludge to sites that are flooded to keep bulk sewage from entering wetlands or other waters of the United States. The regulations do not address sites that could become flooded due to accident, mechanical failure, or an emergency situation.

The EPA regulations prescribe setbacks from waters and prohibit application to sites that are 10 meters or less from the waters of the United States. The regulations do not address a situation such as the Delta islands that are laced with man-made waterways and ditches which constantly carry water around the islands and to pumps which must work year-round to keep the islands from being inundated.

The EPA regulations generally prohibit surface disposal sites in unstable areas, land where natural or human activities might occur that could allow release of pollutants into the environment. Unstable areas include lands where large amounts of soils are moved, such as by landslides, or where the surface lowers or collapses when underlaying materials dissolve. In the Delta Primary Zone, the islands have been deemed unstable due to possible liquefaction of the base of some levees and due to high rates of oxidation and subsidence of peat soil that has resulted in the surface of almost all of the Primary Zone being below sea level and the surface of some islands to be as much as 20 feet below sea level. In the Primary Zone the natural water table would be approximately sea level, however, the groundwater table is artificially maintained through continuous, year-round pumping.

The EPA regulations do not address significant variations in soil characteristics. There has been insufficient research into the effects and fate of sludge added products to specific soils types, particularly soils high in organic content. For example, a given level of metal or other potential toxicant in one soils may be relatively safe, but in other soils of coarser texture, lower pH, varying background concentrations of metal, etc., this level could harm soil productivity or the environment. The Delta Primary Zone is a unique area where much of the soil is peat soil with high organic content, a result of lands reclaimed from tidal wetlands.

2. Unique Delta Wetlands Ecosystem.

The Delta Primary Zone is a unique and fragile wetland ecosystem providing year round and seasonal habitat. The area is large, 450,000 acres in the Primary Zone, and is recognized as a key segment of the Pacific Flyway for migratory birds, as well as habitat for 71 "special status" species of plants birds, mammals, reptiles, amphibians, invertebrates, and fish (list attached) (Department of Fish and Game, SB 34 Delta levees Master Environmental Assessment, October 1995). Of the 71 "special status species", there are 11 rare, endangered, or threatened species including plants, birds, mammals, reptiles, insects, and fish. These species live in all areas of the Delta Primary Zone from the waterways, to tidal areas, to levee berms, to agricultural lands. The U.S. Fish and Wildlife Service designates almost all of the land area in the Primary Zone as "farmed wetlands".

In addition to providing critical habitat for rare and endangered species, almost two-thirds of the State's population obtain at least some of their drinking water from or through the Delta. Land application of sewage effluent and/or sewage sludge in the Primary Zone of the Delta poses risks of adverse impacts to water quality from the potential escape or release or runoff of sewage effluent, sewage sludge, or associated contaminants into the Delta water "pool". There is a constant effort to maintain and/or improve the water quality in the Delta waterways through control over urban nonpoint source discharges, close monitoring of urban wastewater discharges into the Delta, testing and monitoring of pesticide discharges from agricultural drains, etc.

3. Potential Adverse Impacts on Delta Agricultural Lands.

Placement of sewage effluent and/or sewage sludge results in placement of materials containing salts, metals, and other contaminants on a site. These materials are not typically removed during secondary or tertiary treatment of sewage. These materials may build up over time, resulting in cumulative adverse impacts to cultivated crops due to bioaccumulation, concentration of metals, and increased salinity. Construction of new sewage treatment plants would directly displace agricultural use of Delta Primary Zone lands with hard surfaced parking lots and driveways, administration buildings, labs, storage facilities, and treatment facilities.

If metals are over-applied to agricultural lands, the result can be ground pollution, toxicity to plants, build-up of metals in plant tissues and transmission of metals into the food chain. The EPA regulations allow maximum concentrations of metals to be placed on agricultural lands without regard to local soils and water characteristics. Concerns have been raised that the EPA rules allow long-term accumulation in soils of metals such as chromium, cadmium, copper, lead, mercury, nickel, selenium, and zinc to levels from 10 to more that 100 times the present background concentrations in most soils. In addition, some members of the public and some distributors will not purchase agricultural products grown on lands where sewage sludge has been placed.

Much of the land in the Delta Primary Zone is already subjected to high salinity levels. Salts enter the South Delta Primary Zone lands from a variety of sources. In low water flow times of the year, such as later summer and fall, and particularly in times of drought when river flows are critically low, the groundwater is subject to intrusion of salty (brackish) water from San Francisco Bay. In addition, salts are released from agricultural drains, from the South Delta Primary Zone lands themselves, but particularly from agricultural lands south of the Delta on the west side of the San Joaquin Valley. These agricultural lands naturally contain high levels of salts and when irrigated, the agricultural drainage water containing these salts drain into the San Joaquin River which flows north into the Delta. These salt laden waters are the source of irrigation water for the South Delta Primary Zone farmers. Salts are not

generally removed from sewage effluent or sewage sludge in primary, secondary or even tertiary treatment. Special, expensive treatment is needed to remove salts from wastewater. Thus placement of these materials on the Delta Primary Zone lands would add to an already identified problem.

4. Wildlife Habitat on Agricultural Lands.

Lands and waters in the Primary Zone of the Delta serve as year round and seasonal wildlife habitat for numerous species of shoreline and migratory birds, ducks and geese, sandhill cranes, and others. Wildlife and wildlife habitats could be adversely affected by sewage effluent and/or sewage sludge application in the Primary Zone of the Delta. Location of a new sewage treatment plant could displace habitat for rare, threatened, or endangered species.

Several of the species of threatened birds identified in the SB 34 Master Environmental Assessment (October 1995) traditionally feed on Delta agricultural fields in summer (Swainsons hawk) and winter (Sandhill crane). In addition, others of the identified 71 "special status" species of plants, birds, mammals, reptiles, amphibians, invertebrates, and fish in the Delta (see attached list) and 11 rare, endangered, or threatened species of plants, birds, mammals, reptiles, and insects use Delta agricultural lands for parts of their habitat.

In addition, the State of California is pursuing an aggressive program of developing and/or restoring wetland habitats and ecosystems in the State. The State's goal is an additional 225,000 acres to be acquired, restored and enhanced by the year 2010. To date, since 1993, 78,000 acres have been restored. About half are on agricultural lands, especially in the Central Valley habitat of wintering migratory waterfowl. Additional agricultural lands are being considered by State and federal agencies for reflooding for aquatic habitat in the Delta Primary Zone. Concentrations of pathogens, heavy metals, salts and other materials inherent in sewage effluent and sewage sludge

could have impact wetland ecosystems, riparian habitat, and wildlife food chains, and possibly affect rare, threatened, or endangered species in these areas. In the 450,000 acres in the Primary Zone of the Delta, approximately 60,000 acres of agricultural lands are slated to be converted to reservoirs or wetland habitat areas in the near future.

CEQA ANALYSIS

The proposed amendment to the Plan would preclude construction of new sewage treatment facilities and areas of disposal of sewage effluent and sewage sludge in the Primary Zone of the Delta. In the Commission's original consideration of the Plan, the Commission analyzed the possible environmental impacts of the Plan adoption and concluded there would be no significant adverse effects.

There are two exceptions in the proposed amendment, included by the Commission as "grandfathered" projects that had already been analyzed under CEQA in certified Final Environmental Impact Reports (FEIR) adopted with mitigation and findings by the appropriate agencies. These grandfathered projects are: a proposed new sewage treatment plant in the Primary Zone within the City of Rio Vista, west of the Sacramento River and northeast of Highway 12, and a proposed new area of disposal for sewage effluent and sewage sludge on approximately 750 acres of land on Jersey Island in Contra Costa County, south of the San Joaquin River and west of Bethel Island. Neither of these facilities has received permits for construction from the Central Valley Regional Water Quality Control Board. Impacts of these two projects have already been addressed in FEIRs and will not be analyzed further here in detail.

These approved projects are both located in the extreme western areas of the Delta and thus would not release materials into critical aquatic habitats or drinking water sources located in the central Delta Primary Zone. The Rio Vista project is the construction of a new sewage treatment plant; no placement of sewage effluent or sewage sludge is proposed as part of the project. The project is proposed on unirrigated pasture land with elevation between 10 and 20 feet above sea level, with little or no wetland habitat characteristics. The Jersey Island

project provides for disposal of sewage effluent and sewage sludge on 2,600 acres of agricultural lands at extremely low rates; these limits are included in the FEIR. The site is currently used for cattle grazing.

The purpose of the adoption of this regulation is to prevent any significant adverse environmental impacts to the resources of the Delta, including soils, water quality, and wildlife habitats. The impact of the amendment would be to maintain the existing land management practices which are currently monitored and studied by a variety of entities with authority over the Delta lands and waters. These entities include County Health Departments, the State Department of Health Services, the San Francisco and Central Valley Regional Water Quality Control Boards, the State Water Resources Control Board, the Department of Fish and Game, the Department of Water Resources, and others.

It is the practice of many agricultural land managers in the Delta to apply chemical fertilizers in the needed ratios of nitrogen, potassium, and phosphorus, and sometimes zinc and sulphur, to Delta lands. The amount and type of additives is carefully determined by considering soils characteristics, crop needs, availability of materials, costs, and other factors. Organic fertilizers and enhancements, such as chicken manure are not used on peat soils, but are occasionally used on lands on the edges of the Delta with mineral soils.

Review and analysis of the possible significant adverse environmental impacts from adopting the proposed regulation and Plan amendment to maintain the current land management practices indicate there will be no significant adverse environmental impacts from the proposed action. There are no new treatment plants proposed in the Primary Zone. There are some sites associated with the Stockton Treatment Plant ponds and sites which have existing approvals from the CVRWQCB for irrigation of agricultural lands with treated effluent (Jacques); these existing sites and activities would not be affected by the proposed regulation.

Alternatives could include: not adopting of the proposed regulation and Plan amendment; or adoption of a regulation and Plan amendment which allows placement of materials in parts of the Delta Primary Zone which are high enough in surface elevation

to not be subject to flooding if a levee breaks, or parts of the Delta Primary Zone which have sufficient depth to natural groundwater level to preclude possible contamination (groundwater elevations in the Primary Zone are artificially controlled by pumping).

Not adopting the proposed regulation and Plan amendment would allow such activity to proceed in portions of the Primary Zone; San Joaquin County has already adopted a General Plan policy which precludes placement of sewage sludge and sewage effluent in the Delta Primary Zone. Yolo County is currently developing a County ordinance to address regulation of such activities. Contra Costa County says it has never received such an application. Both Solano County and Sacramento County indicate industry interest in disposal of effluent and/or sludge in the Delta Primary Zone.

Adoption of a different regulation and Plan amendment which more specifically defines areas for disposal of sewage effluent and sewage sludge would nonetheless leave very few if any sites eligible for such use. This is because most of the Primary Zone is in the 100 year flood plain as defined by the Federal Emergency Management Agency (FEMA) and is constantly subject to flooding due to levee failure, has a very high natural water table, is near "waters of the United States, drains into "waters of the United States", and/or is in a floodway or bypass. In addition, there is no currently available information for these various criteria, and creation of such a data base would be expensive and time-consuming. The Legal Delta boundary has been in place since 1959, and the Primary Zone boundary has been in place since 1992 and has been depicted on maps which have been widely distributed throughout the region.

Because there are no discernible adverse environmental impacts associated with adoption of the regulation and the Plan amendment, no mitigation measures are proposed or included.

Short-term environmental impacts will be negligible, as adoption of the proposed regulation and Plan amendment will result in no change to current land management practices and no change to the environment.

Long-term impacts again will be negligible, as the proposed regulation and Plan amendment serve to protect the natural resources of the Delta and will result in no change to current land management practices and no adverse change to the environment.

There will be no growth-inducing impacts; the proposed regulation and Plan amendment would limit construction of new sewage treatment facilities in the Primary Zone. However, the existing community facilities would be allowed to be retained, maintained and upgraded as needed to meet community demands and thus protect local resources in and around the existing unincorporated communities.

Analysis of possible cumulative impacts indicates there would be none. Current land management practices would be continued.

Analysis of the potential for adverse environmental impacts show no adverse change from continued use of other areas for disposal. This proposal would not change the use of other sites and potential impacts from other projects would be too uncertain and speculative to analyze here. Prohibiting disposal of sewage effluent and sewage sludge in the Primary Zone would result in the materials continuing to be disposed on other agricultural lands, forests, reclamation sites, or public contact sites such as public parks, plant nurseries, roadsides, golf courses, lawns and gardens, or in landfills outside the Delta Primary Zone.

Some sewage sludge is disposed of in solid waste disposal sites. The State is pursuing programs to reuse, recycle, and divert as much material as possible away from the solid waste disposal sites which have limited capacity, and toward appropriate disposal or land application sites. Programs include recycling of paper, cardboard, glass, metals, waste oil, and yard waste. Many sludge generating entities seek alternative disposal sites and ample sites in other areas of the State remain available for disposal.

The possibilities of potential traffic impacts resulting from this action but which are related to disposal projects and transport associated with those disposal projects **outside** the Delta Primary Zone are uncertain and too speculative to evaluate.

Attached hereto is a list of relevant reference materials which staff reviewed in the preparation of this staff report and which are included in the rulemaking file for the proposed regulation. Also included in the rulemaking file are portions of the administrative record for the adoption of the Land Use and Resource Management Plan for the Primary Zone of the Delta as pertain to the proposed regulation.

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U.S. Fish and Wildlife Service, Recovery Plan for the Sacramento-San Joaquin Delta Native Fishes, 12/94.

California Planning and Development Report, "Wetlands Acreage Up", 2/96

Central California Regional Water Recycling Project Step 1 Feasibility Study, Executive Summary for Administrative Draft Report, 6/12/95

Sacramento Bee, "Sewage-Sludge Idea Hard Sell for County?",

Special Status Species Known or Potentially Known to Occur in the Sacramento-San Joaquin Delta.

	COMMON AND SCIENTIFIC NAME	STATUS	OCCURRENCE IN DELTA
PLANTS	*Suisun marsh aster *Aster lentus*	Fed-C2; CNPS-1B	Common
	Slough thistle *Cirsium crassicaule*	Fed-C2; CNPS-1B	Unknown
	Delta coyote thistle *Eryngium racemosum*	Ca-E; Fed-C2; CNPS-1B	Historic
	Contra Costa wallflower *Erysimum capitatum* var. *angustatum*	Ca-E; Fed-E; CNPS-1B	Antioch Dunes
	*California hibiscus *Hibiscus lasiocarpus*	CNPS-2	Common
	*Delta tule pea *Lathyrus jepsonii* var. *jepsonii*	Fed-C2; CNPS-1B	Common
	*Mason's lilaeopsis *Lilaeopsis masonii*	Ca-R; Fed-C2; CNPS-1B	Common
	Colusa grass *Neostapfia colusana*	Ca-E; Fed-P(T); CNPS-1B	Jepson Prairie Preserve
	*Antioch Dunes evening primrose *Oenothera deltoides* ssp. *howellii*	Ca-E; Fed-E; CNPS-1B	Antioch Dunes, Brannan Island
	*Sanford's arrowhead *Sagittaria sanfordii*	Fed-C2; CNPS-1B	Uncommon
	*Marsh skullcap *Scutellaria galericulata*	CNPS-2	Uncommon
	Blue skullcap *Scutellaria lateriflora*	CNPS-2	Probably extirpated
	Caper-fruited tropidocarpum *Tropidocarpum capparideum*	Fed-C2; CNPS-1A	Possibly extinct
	Solano grass *Tuctoria mucronata*	Ca-E; Fed-E; CNPS-1B	Jepson Prairie Preserve
BIRDS	Common loon (breeding) *Gavia immer*	Ca-CSC	Uncommon (winter)
	American white pelican (nesting colony) *Pelecanus erythrorhynchos*	Ca-CSC	Common (winter)
	Double-crested cormorant (rookery) *Phalacrocorax auritus*	Ca-CSC	Common
	Western least bittern *Ixobrychus exilis hesperis*	Ca-CSC; Fed-C2	Rare
	White-faced ibis (rookery) *Plegadis chihi*	Ca-CSC; Fed-C2	Occasional (non-breeding)
	*Aleutian Canada goose *Branta canadensis leucopareia*	Ca-CSC; Fed-T	Occasional (winter)
	Bald eagle *Haliaeetus leucocephalus*	Ca-E; Fed-E	Rare (winter)
	Northern harrier (nesting) *Circus cyaneus*	Ca-CSC	Common
	Sharp-shinned hawk (nesting) *Accipiter striatus*	Ca-CSC	Uncommon
	Cooper's hawk (nesting) *Accipiter cooperii*	Ca-CSC	Uncommon
	*Swainson's hawk (nesting) *Buteo swainsoni*	Ca-T; Fed-C3c	Common (summer)
	Ferruginous hawk (wintering) *Buteo regalis*	Ca-CSC; Fed-C2	Uncommon (winter)
	Golden eagle *Aquila chrysaetos*	Ca-CSC	Uncommon (winter)

Continued

	COMMON AND SCIENTIFIC NAME	STATUS	OCCURRENCE IN DELTA
	Merlin *Falco columbarius*	Ca-CSC	Uncommon (winter)
	Peregrine falcon (nesting) *Falco peregrinus anatum*	Ca-E; Fed-E	Uncommon (winter)
	Prairie falcon (nesting) *Falco mexicanus*	Ca-CSC	Uncommon (winter)
	*California black rail *Laterallus jamaicensis coturniculus*	Ca-T; Fed-C2	Occasional
	*Greater sandhill crane *Grus canadensis tabida*	Ca-T	Common (winter)
	Long-billed curlew (breeding) *Numenius americanus*	Ca-CSC	Occasional (winter)
	California gull (nesting colony) *Larus californicus*	Ca-CSC	Common (non-breeding)
	Black tern (nesting colony) *Chlidonias niger*	Ca-CSC; Fed-C2	Uncommon (non-(breeding)
	Burrowing owl (burrow sites) *Athene cunicularia*	Ca-CSC	Uncommon
	Long-eared owl (nesting) *Asio otus*	Ca-CSC	Uncommon
	Short-eared owl (nesting) *Asio flammeus*	Ca-CSC	Uncommon
	Mountain plover (wintering) *Charadrius montanus*	Ca-CSC; Fed-C2	Rare (winter)
	Yellow warbler *Dendroica petechia*	Ca-CSC	Uncommon (summer)
	Suisun song sparrow *Melospiza melodia maxillaris*	Ca-CSC; Fed-C2	Suisun Marsh
	*Tricolored blackbird *Agelaius tricolor*	Ca-CSC; Fed-C2	Occasional
MAMMALS	Suisun shrew *Sorex ornatus sinuosus*	Ca-CSC; Fed-C1	Suisun Marsh
	Townsend's western big-eared bat *Plecotus townsendii*	Ca-CSC	Uncommon
	Pallid bat *Antrozous pallidus*	Ca-CSC	Uncommon
	Western mastiff bat *Eumops perotis*	Ca-CSC	Uncommon
	*Salt-marsh harvest mouse *Reithrodontomys raviventris*	Ca-E; Fed-E	Uncommon (western Delta)
	*San Joaquin kit fox *Vulpes macrotis mutica*	Ca-T; Fed-E	Rare (southern Delta)
	Badger *Taxidea taxus*	Ca-CSC	Uncommon
REPTILES/ AMPHIBIANS	California tiger salamander *Ambystoma californiense*	Ca-CSC; Fed-C2	Pools, Jepson Prairie Preserve
	California red-legged frog *Rana aurora draytonii*	Ca-CSC; Fed-C1	Probably extirpated
	Foothill yellow-legged frog *Rana boylei*	Ca-CSC; Fed-C2	Unlikely
	*Western pond turtle *Clemmys marmorata*	Ca-CSC; Fed-C2	Common
	*Giant garter snake *Thamnophis gigas*	Ca-T; Fed-T	Uncommon

Continued

	COMMON AND SCIENTIFIC NAME	STATUS	OCCURRENCE IN DELTA
INVERTEBRATES	Conservancy fairy shrimp *Branchinecta conservatio*	Fed-E	Vernal pools (Jepson Prairie Preserve)
	Vernal pool fairy shrimp *Branchinecta lynchi*	Fed-T	Vernal pools
	Vernal pool tadpole shrimp *Lepidurus packardi*	Fed-E	Vernal pools (Jepson Prairie Preserve)
	*Antioch Dunes anthicid beetle *Anthicus antiochensis*	Fed-C2	Uncommon (Sand dunes)
	*Sacramento anthicid beetle *Anthicus sacramento*	Fed-C2	Uncommon (Sand dunes)
	*Valley elderberry longhorn beetle *Desmocerus californicus dimorphus*	Fed-T	Occasional
	San Joaquin Dune beetle *Coelus gracilis*	Fed-C1	Antioch (possibly extirpated)
	Delta green ground beetle *Elaphrus viridis*	Fed-T	Jepson Prairie Preserve
	Lange's metalmark butterfly *Apodemia mormo langei*	Fed-E	Antioch Dunes
FISH	River lamprey *Lampetra ayresi*	Ca-CSC	Uncommon
	Pink salmon *Oncorhynchus gorbuscha*	Ca-CSC	Uncommon
	Chinook salmon (spring-run) *Oncorhynchus tshawytscha*	Ca-CSC	Occasional
	*Chinook salmon (winter-run) *Oncorhynchus tshawytscha*	Ca-E; Fed-E	Occasional
	*Delta smelt *Hypomesus transpacificus*	Ca-T; Fed-T	Uncommon
	*Sacramento splittail *Pogonichthys macrolepidotus*	Ca-CSC; Fed-P(T)	Occasional
	Hardhead *Mylopharadon conocephalus*	Ca-CSC	Uncommon
	Sacramento perch *Archoplites interruptus*	Ca-CSC; Fed-C2	Possibly extirpated

CODES:

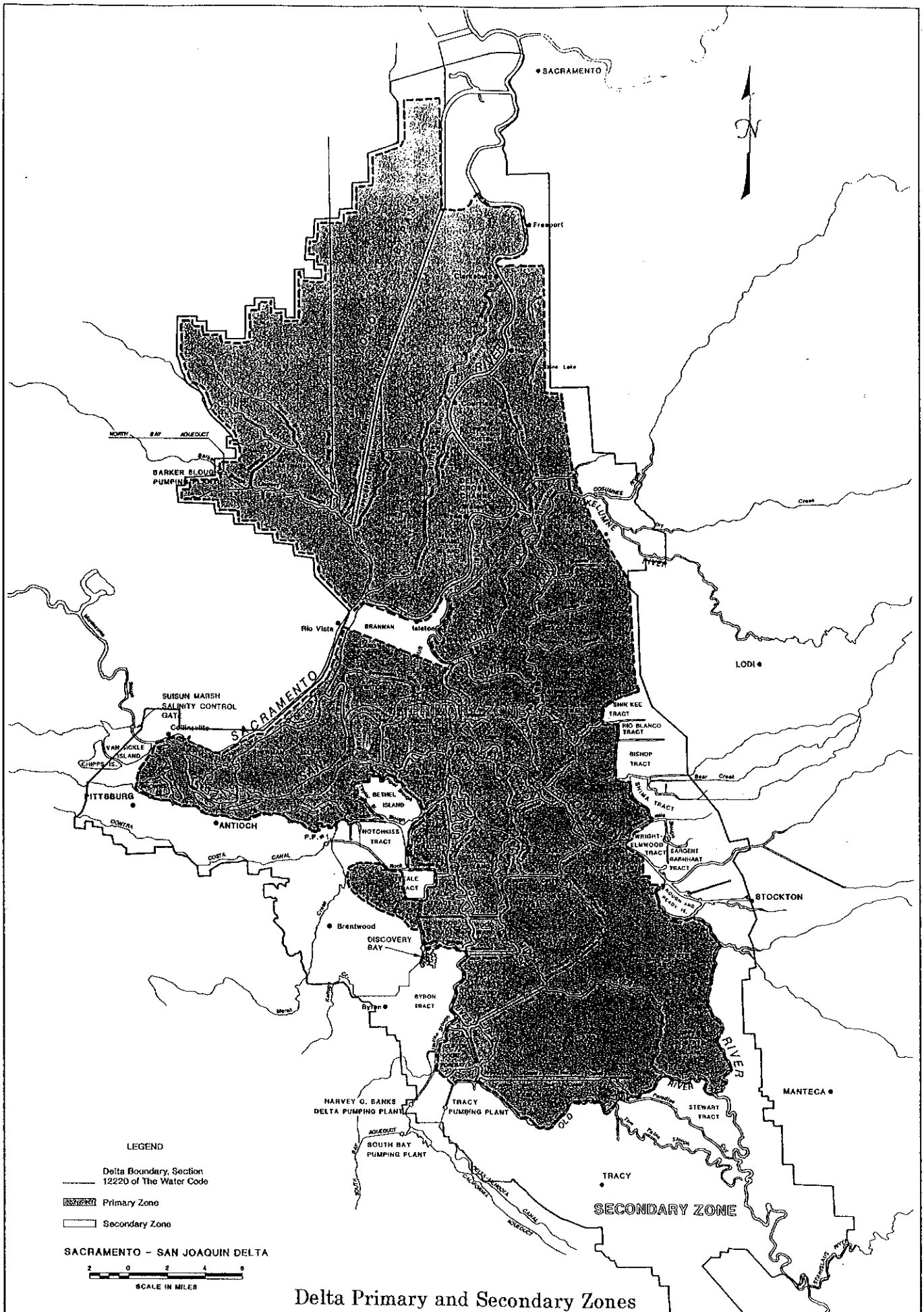
Ca-E (Listed as Endangered by the State of California)
Ca-T (Listed as Threatened by the State of California)
Ca-R (Listed as Rare by the State of California)
Ca-CSC (California Department of Fish and Game "Species of Special Concern")

Fed-E (Listed as Endangered by the Federal Government)
Fed-T (Listed as Threatened by the U.S. Fish and Wildlife Service)
Fed-P(T) (Proposed as Threatened by the U.S. Fish and Wildlife Service)

Fed-C1 (Category 1 Candidate for listing by the U. S. Fish and Wildlife Service)
Fed-C2 (Category 2 Candidate for listing by the U.S. Fish and Wildlife Service)
Fed-C3c (Category 3c Candidate for listing by the U.S. Fish and Wildlife Service)

CNPS-1A (California Native Plant Society List 1A Plant)
CNPS-1B (California Native Plant Society List 1B Plant)
CNPS-2 (California Native Plant Society List 2 Plant)

Species marked with a (*) are most likely to be found near SB 34 work areas and are discussed in greater detail in Appendix E.



Delta Primary and Secondary Zones